

Boulder County Resource Conservation

Project Manager: Jeff Callahan (720) 564-2221
Project Staff: Jennifer Marie Shriver, CHMM
Grant Program: Roofs to Roads (RTR009)
Grantor: Environmental Protection Agency
Grant Number: X1 – 97877201 – 0
CFDA: 66.808
Total funding: \$50,000

PROGRESS REPORT FOR ENTIRE PROJECT DATED 12/31/2011

The scope of work for the project, with our four primary objectives, can be found in Section A. Primary Accomplishments are presented in Section B, and a Summary of Project Activities is contained in Section C.

Section A. Primary Objectives

1. Reduce solid waste by reducing the quantity of asphalt shingles going to landfills – Recycle Asphalt Shingles (RAS) from Roofing Demolition Projects.

Methodology:

Outreach and Training Program for Roofing Contractors

- Develop and implement educational and motivational outreach program for roofers and the building construction community, and make training available through all media including the internet. Training will address the programs and policies affecting asphalt shingle recycling, the environmental and economic benefits of recycling shingles, technical performance issues for RAS pavement, and importance of increasing shingle recycling.
- Outreach program to the Green Building Community, including the Boulder Green Building Guild, to ensure all building professionals know that recycling construction and demolition waste (e.g. shingles) can assist with LEED points.
- Present workshops and create educational materials for roofing contractors and other building contractors on the benefits to them of recycling waste shingles.

2. Increase use and viability of RAS in paving projects in Boulder County and in Colorado.

Methodology:

- Beneficially re-use asphalt shingles in five demonstration paving projects, using 250 – 500 tons of RAS, with Boulder County and the cities and towns within the County: the Cities of Boulder, Longmont, Lafayette, Louisville, and the towns of Nederland, Jamestown, and Erie.
- Use pilot or demonstration projects to facilitate technical and regulatory acceptance of RAS use in asphalt paving projects.
- Create partnerships with highway engineers, Public Works Departments and Transportation Departments.

- Support full technical documentation of paving projects so that highway engineers can become familiar and comfortable with this new technology.
- Provide four technical workshops for highway engineers. Training will address programs and policies affecting RAS use, environmental protection and environmental benefits of RAS use, technical performance, barriers, and/or other needs for increasing IMR
- Offer field trips to locations of demonstration paving projects to provide data, on-the-ground practical evaluation and opportunity to look at material.
- Develop ongoing testing protocol for long-term evaluation and testing of the performance of asphalt pavement with a component of RAS.

3. Support markets for asphalt shingles, including supportive regulatory measures and technical specifications from local, state, and regional agencies, and contribute to national development of the RAS industry.

Methodology

- Work with the Green Highways initiative to bring attention to use of RAS.
- Develop draft specifications for cities, counties, and towns, to support local governments' use of RAS paving material.
- Develop an environmentally preferable purchasing program.
- Develop outreach or support for IMR markets.

4. Develop and leverage partnerships among Roofs to Roads stakeholders to take advantage of opportunities and overcome obstacles as they arise.

Methodology

- Conduct quarterly advisory board meetings with representatives from the asphalt paving industry, local and state highway engineers, roofing contractors and other green building contractors, and concerned regulatory agencies.
- Provide monthly reports to the Advisory Board to facilitate the ongoing oversight, trouble-shooting, and course correction this group can provide.

Section B: Primary Accomplishments

1. To launch the program, an Advisory Board Meeting was held on October 1, 2009. The Advisory Board includes representatives from roofers, the asphalt paving industry, shingle collection and processing points, state and local transportation departments, and state, county, and local agencies. Quarterly Advisory Board meetings continued throughout the project; the minutes of all Advisory Board meetings are part of the project records and are available on request. **(Objective 4)**
2. Shingle collections grew from 500 tons to 2,500 tons per month in 2010, and to 4,500 tons per month in 2011. In 2009, collection was free. In 2010 and beyond, most collection sites are charging a tipping fee. Despite the fee, shingle collection continued to be steady and to increase. A steady supply of clean, asbestos-free shingles is one essential element of shingle re-use as the asphalt industry needs to be able to rely on this supply. Four shingle collection points are now operating in

Colorado, 3 in Denver and 1 in Colorado Springs. Project staff have worked to develop these and other new shingle collection points, providing information, assisting collection efforts, posting new collection points on the website, and informing collection point staff about the importance of meeting state and local requirements (fire codes; storm water permits; recycling permits, etc.) There is interest in Littleton, Pueblo, and Fort Collins for future shingle collection points. **(Objective 1)**

3. Training and education for roofers and green builders was ongoing throughout the project; an updated flyer for roofing contractors was sent out to Front Range Building Permit offices, with articles and presentations for the Colorado Roofers' Association. A powerpoint presentation for roofers that outlines the basics of shingle recycling is available on the website. Many roofing contractors apply for building permits, by posting flyers about shingle recycling in these offices and in this way we reach roofers who are not yet participating in the program. We spoke with Building Permit Office staff at cities and counties all along the Front Range; everyone was excited and pleased to hear about the project and to share the information with roofers and other building contractors. **(Objective 1)**
4. In November 2009, we held our first webinar (*Using Recycled Shingles in Asphalt Paving Projects*). The webinar attracted over 100 registrants, with over 90 phone lines active during the webinar. The Colorado Asphalt Pavement Association (CAPA), the webinar host, documented over 200 listeners to the webinar. Follow-up information was sent out, and these participants were contacted to explore the use of RAS in paving projects in 2010 and 2011. **(Objective 2)**
5. In the fall of 2009, we created a brochure for transportation engineers. It describes the paving projects that have taken place in Colorado, technical studies and reports on the use of RAS in asphalt paving projects, and examples of specifications from other states allowing RAS. This brochure was distributed to transportation engineers across the state.
6. Project staff worked with CAPA and the Colorado Department of Transportation (CDOT) on Quality Assurance/Quality Control issues, and to finalize CDOT protocol on submittal of non-standard mix designs, which was finalized and approved (Colorado Procedure 59-XX, Standard Practice for Contractor Non-Standard Asphalt Mix Approval). **(Objectives 2 and 3)**
7. In April 2011, CDOT presented a one-day workshop where the CDOT draft specification allowing RAS was presented. This standard special revision revises Section 401 of CDOT's *Standard Specifications for Road and Bridge Construction*. Boulder County is in the process of developing a specification allowing RAS in all asphalt paving projects, with review by the project engineer. Typically in Colorado all municipal and county road engineers follow the CDOT specifications, so CDOT's RAS specification will have a large state-wide impact. **(Objectives 2 and 3)**

8. In May 2011, the first CDOT project was paved under the draft specification. 900 tons of RAS was placed in the west-bound lane of Highway 36.
9. Project staff networked with the Construction Materials Recycling Association (CMRA) and their Shingle Recycling initiative, with Federal Highway Administration (FHWA) officials working on Green Highways efforts, with the Greenroads Rating System (an initiative led by the University of Washington), and with engineers in state DOTs around the country who are developing specifications allowing the use of shingles. **(Objectives 2 and 3)**
10. Project staff held meetings to discuss the use of RAS with City Engineers in the cities of Boulder, Longmont, Lafayette, Louisville, Arvada, and Broomfield, the town of Erie, Adams County, and with the City and County of Denver, as well as with CU Boulder's Conservation and Engineering, Facilities Maintenance, and Parking and Transportation Departments. **(Objectives 2 and 3)**

Section C: Summary of Project Activities

TRANSPORTATION ENGINEER OUTREACH

- Boulder County staff attended the National Shingle Recycling Forum in Chicago in November 2009, connecting with national leaders in shingle recycling, engineers, regulators, and advocates for use. During the course of the project, we drew on this pool of experts to share their expertise with our advisory board and local engineers who are considering paving projects using shingles.
- Our staff submittal for a presentation at the American Society of Civil Engineers Transportation Conference was accepted, and that power point presentation will be part of the conference proceedings.
- To promote the November 2009 webinar we held (*Using Recycled Shingles in Asphalt Paving Projects*), and encourage discussion among transportation engineers, over 300 copies of our brochure on technical aspects of using recycled shingles in asphalt pavements were distributed.
- As listed above, Boulder County staff held six meetings with transportation engineers and public works directors of neighboring towns and counties. The meetings were intended to share technical information about RAS and to encourage the participants to use RAS in their 2010 paving projects. Information about this project was also presented at the January 2010 meeting of the Metropolitan Government Engineers Paving Council. Based on these presentations, we were invited to present at the Annual Member's Meeting in April 2010.
- Project staff participated in the National Asphalt Pavement Association's Paving Greener Conference in Denver, in November 2010.

SHINGLE COLLECTION

- Since shingle collection began in Spring 2009; over 200,000 tons of shingles have been diverted from landfills in Colorado. Outreach and educational efforts to roofers have been very successful, especially placing outreach flyers in Building Permit offices along the Front Range, allowing roofers to readily obtain the information. Workshops and training for roofers was also well-received and these events allowed us to further streamline our educational efforts and improve the project design so it was even easier for roofers to collect shingles.
- Boulder County's Construction and Demolition recycling program is still in its planning phase. A shingle collection point in Boulder County is under consideration as part of the County's C & D diversion efforts.

ADVISORY BOARD

- A detailed example of one Advisory Board meeting follows. This meeting took place on April 26th, 2010, at EPA Region VIII headquarters. The meeting included a tour of the building (a LEED Gold building), and reports from: the Iowa DOT, which released a specification for asphalt pavement in January 2010 that allows recycled asphalt shingles at 2-5% by weight; from the Greenroads Rating System project, a system to accredit sustainably built roads; and a report from the City of Madison, Wisconsin, the first city in the US to mandate shingle recycling as part of its construction and demolition regulations.
- Advisory Board meetings also discussed the use of RAS on LEED Platinum projects.

PRESENTATIONS

- November 12, 2009, webinar (*Using Recycled Shingles in Asphalt Paving Projects*). The recorded webinar was posted on the CAPA website in follow-up, as well as a link to it posted on EPA Region 8's Industrial Materials Recycling website.
- Project staff participated in 2 webinars (one national, one state) on RAS. A webinar hosted by the Construction Materials Recycling Association addressed quality control issues and other re-use issues with RAS. A webinar hosted by CAPA reviewed recent DOT specifications allowing RAS, in the state of Iowa. The CAPA webinar focused on QA/QC concerns and ensuring high-quality RAS in paving projects, to ensure the ongoing success of asphalt shingle recycling and re-use.
- Project staff presented information about use of RAS at the annual meeting of the Metropolitan Government Pavement Engineers Council in April 2010, and at the Colorado Association for Recycling annual conference, in June 2010. Our staff submittal for a presentation at the American Society of Civil Engineers Transportation Conference was accepted, and the presentation was given in November 2010.
- Project staff presented information about use of RAS at the annual meeting of the 2010 Joint North Dakota/South Dakota Conference and Trade Show. Over 150 people attended the workshop on RAS, conference organizers said the presentation was very well received, and several individuals and organizations

expressed interest in developing asphalt shingle recycling and re-use in the Dakotas.

- Boulder County Transportation Engineers presented information on the use of RAS at the Rocky Mountain Asphalt Education Conference in March 2010 and in April 2011.
- Project staff and Advisory Board members presented at the national 5th Asphalt Shingle Recycling Forum in Dallas in October 2011, showcasing the project's successes and challenges.
- Project staff participated in a US EPA Region 8 sustainable materials management conference call in September 2011 for state solid waste programs and recycling coordinators, sharing our experience about recycling and reuse of asphalt shingles with other states in the region.
- Colorado State Senator Rollie Heath contacted our office to learn more about the project. Senator Heath toured of asphalt shingle collections and paving projects in his district. With his interest and support for the use of RAS in asphalt pavements, project staff met with Senator Heath and senior CDOT staff in December 2010, discussed the need for a CDOT specification allowing RAS, and explored the potential for CDOT RAS pilot projects.

SPECIFICATIONS

- Project staff worked with the Colorado Asphalt Pavement Association and the Colorado Department of Transportation on Quality Assurance/Quality Control issues in support of CDOT's draft protocol on submittal of non-standard mix designs.
- We've met with Boulder County Transportation Department on their standard asphalt specification, which will include a percentage of recycled asphalt shingles for all asphalt paving projects.

PAVING PROJECTS

Well over 10,000 tons have been used in the following projects:

1. April 2009: North 63rd Street, Boulder - The first road in Colorado paved using recycled asphalt shingles
2. July 2010: Access roads in Red Rocks Park, with the City and County of Denver
3. Summer 2010: Boulder County overlay project, with Boulder County Transportation Department
4. Summer 2010: Rec Center Parking Lot in Louisville
5. August 2010: University of Colorado at Boulder, access road and parking lot
6. August 2010: 63rd Street in the City of Boulder, with the City of Boulder Transportation Department
7. August 2010: Subdivision Overlay projects with the City of Aurora
8. September 2010: Boulder County Sheriff's Parking Lot Extension
9. October 2010: Parking lot for the new Boulder County Household Hazardous Waste Facility
10. May 2011: Highway 36, Westbound Lane, 10 miles.
11. September 2011: Cherryvale Road in Boulder County
12. October 2011: Valmont Road in Boulder County

13. November 2011: 10th Street, City of Greeley

Ongoing performance of paving projects is being monitored by the owning agency, all of which have some kind of ongoing pavement evaluation. This information will be updated twice annually and posted on the Roofs to Roads website.

The use of asphalt shingles in these paving projects has mitigated over 1,306 metric tons of CO₂ equivalents (1,306 MTCO₂E).¹

¹ U.S. EPA. Waste Reduction Model (WARM), updated August 2010. Accessed January 5, 2012. Note: The model's default assumptions for landfill characteristics and material transport distances were used.